

REMARKS

By the above amendment, the claims, including claims withdrawn from consideration, have been amended in a manner which should overcome the claim objections and the claim rejections under 35 U.S.C. §112, second paragraph. Additionally, new claims 56-66 have been presented reciting features of the present invention, as will be discussed below.

Turning to the objection to the claims, the claims have been amended to utilize proper grammar as indicated by the Examiner and correct the informalities noted.

With respect to the rejection of claims under 35 U.S.C. §112, second paragraph, claim 16 has been amended to delete the inappropriate use of "wherein" and claims 24 and 25 have been amended to delete the duplicate recitation of "claim 1", such that these claims should now be considered to be in compliance with 35 U.S.C. §112, second paragraph.

As to the rejection of claims 1-8, 10-12, 14-29, 31-34, 36, 50-53 and 55 under 35 U.S.C. 103(a) as being unpatentable over Yokogawa et al, U.S. Patent 5,891,252 in view of Collins et al, U.S. Patent 6,068,784 and Singh et al, U.S. Patent 6,042,687; the rejection of claim 9 under 35 U.S.C. 103(a) as being unpatentable over Yokogawa et al in view of Collins et al and Singh et al and further in view of Gupta et al, U.S. Patent 5,902,494; the rejection of claims 1-8, 10-12, 14-29, 31-34, 36, 50-53 and 55 under 35 U.S.C. 103(a) as being unpatentable over Yokogawa et al, JP 9-321031 (Machine translation) in view of Collins et al, U.S. Patent 6,068,784 and Singh et al, U.S. Patent 6,042,687; and the rejection of

claim 9 under 35 U.S.C. 103(a) as being unpatentable over Yokogawa et al, JP 9-321031 in view of Collins et al and Singh et al and further in view of Gupta et al, U.S. Patent 5,902,494; such rejections are traversed insofar as they are applicable to the present claims, and reconsideration and withdrawal of the rejections are respectfully requested.

Turning first to the rejection of the claims based upon Yokogawa et al, U.S. Patent 5,891,252 in combination with the other cited art, applicants submit that all of these rejections fall based upon the fact that Yokogawa et al, U.S. Patent 5,891,252 is not available as prior art under 35 U.S.C. 103(c). That is, applicants submit that Yokogawa et al, U.S. Patent 5,891,252 qualifies as prior art only under one or more of subsections (e), (f), and (g) of §102 of Title 35 and in accordance with 35 U.S.C. 103(c), subject matter as represented by Yokogawa et al, U.S. Patent 5,891,252 shall not preclude patentability under 35 U.S.C. 103 where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. In this case, Yokogawa et al, U.S. Patent 5,891,252 and the present application are assigned to the same person as represented by Hitachi, Ltd., and were subject to such assignment, where the subject matter of Yokogawa et al, U.S. Patent 5,891,252 and the claimed invention were, at the time the invention was made, owned by or subject to an obligation of assignment to Hitachi, Ltd.. Thus, applicants submit that all claims based

upon the rejection utilizing Yokogawa et al, U.S. Patent 5,891,252 necessarily fall.

Before discussing the other rejections, applicants note that as to the requirements to support a rejection under 35 U.S.C. 103, reference is made to the decision of In re Fine, 5 USPQ 2d 1596 (Fed. Cir. 1988), wherein the court pointed out that the PTO has the burden under §103 to establish a prima facie case of obviousness and can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. As noted by the court, whether a particular combination might be "obvious to try" is not a legitimate test of patentability and obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. As further noted by the court, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

Furthermore, such requirements have been clarified in the recent decision of In re Lee, 61 USPQ 2d 1430 (Fed. Cir. 2002) wherein the court in reversing an obviousness rejection indicated that deficiencies of the cited references cannot be remedied with conclusions about what is "basic knowledge" or "common knowledge". The court pointed out:

The Examiner's conclusory statements that
"the demonstration mode is just a

programmable feature which can be used in many different device[s] for providing automatic introduction by adding the proper programming software" and that "another motivation would be that the automatic demonstration mode is user friendly and it functions as a tutorial" do not adequately address the issue of motivation to combine. This factual question of motivation is immaterial to patentability, and could not be resolved on subjected belief and unknown authority. It is improper, in determining whether a person of ordinary skill would have been led to this combination of references, simply to "[use] that which the inventor taught against its teacher."... Thus, the Board must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the agency's conclusion. (emphasis added)

Applicants note that the rejections based upon Yokogawa et al, JP 9-321031 may be considered proper in Yokogawa et al, JP 9-321031 has a publication date of December 12, 1997. However, Yokogawa et al, JP 9-321031 has the deficiencies as recognized by the Examiner at page 7 of the Office Action. Applicants submit that the proposed combination of Yokogawa et al JP 9-321031 with Collins et al and Singh et al represent a hindsight reconstruction attempt utilizing the principle of "obvious to try" which is not the standard of 35 U.S.C. 103 and is not based upon the teachings in the individual references.

Applicants note that the Examiner recognizes that Yokogawa et al and Collins et al do not expressly disclose the claimed ring-shaped member. Applicants submit that this characterization of Yokogawa et al and Collins et al is

misdescriptive in that neither Yokogawa et al or Collins et al disclose or teach the claimed ring-shaped member as recited in independent claims 1 and 34 of this application, which is disposed in a periphery of the sample. The Examiner refers to Singh et al as disclosing a ring-shaped member 172 disposed in a periphery of the substrate and contends that in view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the ring-shaped member in the apparatus of the Yokogawa et al and the Collins et al references to improve the plasma uniformity. Applicants note, however, that in accordance with Singh et al, the ring-shaped member 172 is a gas ring which supplies gas at a periphery of the substrate 120. In contradistinction, the ring-shaped member of the present invention does not supply gas and, has electric power applied thereto as illustrated in Fig. 1 of the drawings of this application. Moreover, Singh et al is directed to solving the problem that the etching rate is large and the periphery of the wafer and supplies gas thereat for making the etching rate uniform on the wafer. Applicants submit that it is apparent that Singh et al does not disclose the provision of a ring-shaped which has electric power supplied thereto without supplying gas therethrough, which features are now recited in new dependent claims 56 and 57, and which features regarding the supply of electric power is set forth in other dependent claims of this application. Thus, the attempted combination of Singh et al with the other cited art to reconstruct the claimed invention represents a hindsight reconstruction

attempt without regard to the teachings of the individual references and is not proper in the sense of 35 U.S.C. 103.

As such, applicants submit that the independent and dependent claims of this application patentably distinguish over the combination of Singh et al with the other cited art.

In this regard, it is noted that the Examiner has recognized that Yokogawa et al does not disclose a main control means, but that Collins et al discloses an apparatus in which a controller 86 is used to automate the plasma apparatus. Hereagain, applicants submit that this combination is not proper in the sense of 35 U.S.C. 103. See In re Fine, supra and In re Lee, supra.

With respect to the additional reference to Gupta et al in combination with Yokogawa et al, Collins et al and Singh et al, applicants note that Gupta et al also does not overcome the aforementioned deficiencies of Yokogawa et al in combination with the other cited art. Additionally, applicants note that Gupta et al is directed to a CVD apparatus rather than an etching apparatus, as claimed, such that hereagain, the combination represents a hindsight reconstruction attempt of the present invention, which is not proper under 35 U.S.C. 103.

For the above noted reasons, applicants submit that the combination of Yokogawa et al, JP 9-321031 with the other cited art does not provide the claimed features as set forth in the independent and dependent claims in the sense of 35 U.S.C. 103, such that all claims should be considered allowable thereover.

Additionally, applicants note that the Examiner has not given proper consideration to other features of the independent and dependent claims of this application, which features are now more particularly set forth in newly presented independent claim 58, but which features are also found in independent claims 1 and 34, which independent claims also recite the ring-shaped member. More particularly, independent claim 58 recites the feature of a plasma etching system with a controller for introducing the electromagnetic field from a planar plate disposed in parallel with a sample into the vacuum chamber, for setting a distance between the plate and the sample to a value in a range of 30 mm to one half of the smaller one of respective diameters of the sample and the plate, and for controlling a quantity of reaction between a surface of the planar plate and radicals in the plasma, wherein the distance between the sample and the plate is maintained during plasma etching. As described at page 10, line 9 to page 11, line 6, in accordance with the present invention, the distance between silicon layer 10 on plate 5 and sample 6 is adjusted in a range from 30 mm to one half of the sample diameter, with the distance being defined so as to maintain a reduction effect of the radicals. As pointed out at page 12, lines 12-16 of the specification, when the distance between the plate 5 and sample 6 is reduced to 30 mm or less, the pressure distribution in the sample surface of the gas fed from the surface of the plate 5 becomes worse, which cannot be ignored when the sample diameter increases. That is, if the distance is too narrow, the pressure of the

central portion of the sample becomes high and the pressure of the peripheral portion of the sample becomes low. Due to such pressure difference (non-uniformity of the pressure), gas flows more easily in the peripheral portion than the central portion and the pressure distribution in the sample surface deteriorates.

By the present invention and the relationships as set forth in the independent claims, a range of distances is utilized, with the minimum distance being 30 mm, which overcomes such problem. Irrespective of the contentions by the Examiner, the features as recited in each of independent claims 1, 34 and 58 and the dependent claims are not disclosed or taught by Yokogawa et al, JP 9-321031, taken alone or in combination with the other cited art in the sense of 35 U.S.C. 103. More particularly, Yokogawa et al (Machine translation) at page 4, lines 15-16, indicates the distance between the process sample 110 and the round conductor plate 107 are adjusted from 2 cm to 30 cm which provides a range much greater than that recited in claims of this application, and at least at the lower end provides no disclosure or teaching that a distance less than 30 mm will not provide the claimed features. Thus, applicants submit that all claims of this application including independent claims 1, 34 and newly presented independent claim 58, patentably distinguish over Yokogawa et al in the sense of 35 U.S.C. 103 with respect to the aforementioned features.

With respect to Collins et al, applicants note that irrespective of the teachings of this patent, Collins et al

provides no disclosure or teaching concerning a distance between the wafer and the antenna as a control parameter of the control system thereof, with Collins et al disclosing in col. 9, lines 41-53, the distance between the bottom turn of antenna 30 and the wafer 5 is between 10 centimeters and 5 centimeters. Hereagain, it is apparent that Collins et al does not disclose the relationship as set forth in the independent claims, and moreover, applicants submit that the antenna 30 of Collins et al is a coil like antenna disposed outside of the chamber and does not correspond to the planar plate of the present invention. Hereagain, applicants submit that it is not proper to combine Yokogawa et al and Collins et al in the sense of 35 U.S.C. 103.

As to Singh et al, as pointed out above, Singh et al is directed to solving the problem that the etching rate is large at the periphery of the wafer and provides a gas ring so as to scavage gas flow from the gas ring to the periphery of the wafer so as to enable the etching rate to be made uniform on the wafer. Singh et al does not provide any disclosure or teaching concerning distances as recited in the claims of this application, such that as pointed out above, not only does Singh et al fail to provide a ring-shaped member operating in the manner disclosed in this application, but does not provide any disclosure concerning the distance relationship as set forth. As such, this combination fails to provide the claimed features as set forth in the independent and dependent claims of this application in the sense of 35 U.S.C. 103.

As to Gupta et al, as pointed out above, this patent is not directed to an etching apparatus and cannot be properly combined with Gupta et al also failing to disclose the distance relationship as set forth. As such, the independent claims of this application, i.e. claims 1, 34 and 58, patentably distinguish over Yokogawa et al, JP 9-321031 taken alone or in combination with the other cited art in the sense of 35 U.S.C. 103, and all claims should be considered allowable thereover.

With respect to the dependent claims, applicants note that the dependent claims recite further features when given proper consideration patentably distinguish over the cited art, when considered in conjunction with the parent claims. Thus, all claims should be considered allowable thereover.


In view of the above amendments and remarks, applicants submit that the objections and rejections under 35 U.S.C. §112, second paragraph, have been overcome and all claims patentably distinguish over the cited art and should be considered allowable at this time. Accordingly, issuance of an action of a favorable nature is courteously solicited.

Applicants note that in accordance with the duty of disclosure under 37 CFR 1.56, submitted herewith is a copy of U.S. Patent No. 5,556,500 to Hasegawa et al, which issued September 17, 1996. Applicants note that Hasegawa et al discloses an etching apparatus in which a focus ring 102 which surrounds the wafer is provided. Applicants note, that Hasegawa et al does not disclose the relationship of a distance between a planar plate and the sample, as described

in the claims of this application. Consideration of this document is requested.

To the extent necessary, applicant's petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (500.37328CX1) and please credit any excess fees to such deposit account.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please amend the claims 2-12, 14-33 and 36-54 as follows:

2. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 1, wherein the planar plate has a diameter ranging from 0.7 times that of the sample to 1.2 times that of the sample.

3. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 1, wherein the electromagnetic wave to generate plasma has a frequency ranging from 300 MHz to 500 MHz.

4. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 1, wherein the electromagnetic field generated by the electromagnetic field generating means to generate plasma has intensity satisfying a condition for electron cyclotron resonance between the planar plate and the sample.

5. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 1, wherein the means for controlling reaction between the surface of the planar plate and the plasma is means for superposing an electromagnetic wave of a second frequency onto the planar plate, the electromagnetic wave being different from the electromagnetic wave of a frequency ranging from 300 MHz 500 MHz.

6. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 1, wherein the means of controlling reaction between the surface of the planar plate and the plasma is means for controlling temperature of the planar plate.

7. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 5, wherein the means for controlling reaction between the surface of the planar plate and the plasma is means for superposing an electromagnetic wave of a second frequency onto the planar plate, the electromagnetic wave being different from the electromagnetic wave of a frequency ranging from 300 MHz 500 MHz and the means of controlling reaction between the surface of the planar plate and the plasma is means for controlling temperature of the planar plate.

8. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 5, wherein:

the second frequency of the electromagnetic wave superposed to the planar plate ranges from 50 kHz to 30 MHz; and

the frequency applied to the planar plate has power of 0.05 W/cm^2 to 5 W/cm^2 .

9. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 1, wherein:

the planar plate includes a plurality of holes; and

the source material gas is supplied through the holes.

10. (twice amended) A plasma etching system in accordance with ~~Claim~~-claim 1, wherein the planar plate includes a surface to be brought into contact with the plasma, the surface being made of silicon, carbon, silicon carbide, quartz, aluminum oxide, or aluminum.

11. (twice amended) A plasma etching system in accordance with ~~Claim~~-claim 6, wherein the means for controlling temperature of the planar plate controls the temperature by circulating a liquid of which temperature is controlled in the planar plate.

12. (twice amended) A plasma etching system in accordance with ~~Claim~~-claim 10, wherein the gas supplying means is arranged at a position in the vacuum chamber, the position is at an inner position of the vacuum chamber relative to the material surface arranged on the surface of the planar plate to be brought into contact with the plasma.

14. (twice amended) A plasma etching system in accordance with ~~Claim~~-claim 1, wherein the ring-shaped member includes a surface to be brought into the plasma, the surface being made of silicon, carbon, silicon carbide, quartz, aluminum oxide, or aluminum.

15. (twice amended) A plasma etching system in accordance with ~~Claim~~-claim 1, wherein the ring-shaped member is applied with high-frequency power.

16. (twice amended) A plasma etching system in accordance with ~~Claim~~-claim 15, further including a ~~wherein~~ member to apply high-frequency power to the ring-shaped member, wherein

the power applying member is so configured to separate part of the high-frequency power applied to the sample to apply the part to the ring-shaped member.

17. (twice amended) A plasma etching system in accordance with ~~Claim~~-claim 1, wherein means for reducing variation in time of radicals incident to the sample is a wall of the vacuum chamber and the planar plate and means for control of temperature of the ring-shaped member.

18. (twice amended) A plasma etching system in accordance with ~~Claim~~-claim 14, wherein the ring-shaped member has a height ranging from 0 mm to 40 mm relative to the sample surface in a direction vertical to the sample surface.

19. (twice amended) A plasma etching system in accordance with ~~Claim~~-claim 14, wherein the ring-shaped member has a width ranging from 20 mm to the distance between the planar plate and the sample in a direction horizontal to the sample surface.

20. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 16, wherein the member to apply high-frequency power to the ring-shaped member and to separate part of the high-frequency power applied to the sample is a capacitor or has a function of a capacitor.

21. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 1, wherein the planar plate to supply an electromagnetic wave into the vacuum chamber is coupled via a dielectric substance to a plate at an earth potential.

22. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 1, wherein:

the planar plate has a shape of a disk;

the planar plate has a central section connected to a conductor in a shape of a circular cone; and

the planar plate supplies the electromagnetic wave via the conductor.

23. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 17, wherein:

the means for controlling temperature of the vacuum chamber, the planar plate, and the ring-shaped member controls the temperature by circulating a liquid of which temperature is controlled; and

the temperature controlled ranges from 20°C to 140°C.

24. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 1, wherein the magnetic field generated by the magnetic field generating means has magnetic lines of force, the lines having a direction vertical to the planar plate and the sample surface ~~of Claim 1~~.

25. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 1, wherein the magnetic field generated by the magnetic field generating means has magnetic lines of force, the lines having a direction substantially vertical to the planar plate and the sample surface ~~of Claim 1~~.

26. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 1, wherein all or part of the surface of the planar plate to be brought into contact with the plasma is coated with dielectric.

27. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 26, wherein the dielectric covering all or part of the surface of the planar plate to be brought into contact with the plasma is quartz, aluminum oxide, silicon nitride, or polyimide resin.

28. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 26, wherein temperature of the dielectric is controlled to a fixed value in a range from 20°C to 250°C.

29. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 1, further including a filter in a power supply path to supply the electromagnetic wave with a frequency ranging from 300 MHz to 500 MHz to the planar plate, the filter allowing the high-frequency power applied to the sample to flow to the earth.

30. (twice amended) A plasma etching method for use with a plasma etching system in accordance with ~~Claim~~claim 1, comprising the step of applying the high-frequency power with a frequency ranging from 200 kHz to 14 MHz to the sample with a density of 0.5 W/cm² to 8 W/cm² to achieve surface processing of the sample.

31. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 15, wherein the high-frequency power is applied to the ring-shaped member with a density of 0 W/cm² to 8 W/cm² in the surface of the member to be brought into contact with the plasma.

32. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 1, wherein:

a height relative to the sample surface and a width of the magnetic field region associated with the electron cyclotron resonance condition generated between the planar plate and the sample by the magnetic field generating means are controlled; and

radicals generated in the plasma is controlled.

33. (thrice amended) A plasma etching system in accordance with ~~Claim~~claim 3, wherein:

the vacuum chamber includes an upper section made of an insulating material;

the system further including, on an atmosphere side of the insulating material, a planar plate arranged via dielectric at an earth-potential; and

the electromagnetic wave is applied to the planar plate to generate plasma in the vacuum chamber through reaction between the electromagnetic wave and the magnetic field.

36. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 34, wherein the member placed at a position facing the sample is made of quartz, aluminum oxide, silicon, silicon nitride, silicon carbide, or polyimide resin.

37. (twice amended) A plasma etching method for use in a plasma etching system in accordance with ~~Claim~~claim 1, comprising the steps of:

using a mixture of argon and C_4F_8 as the source material gas; and

etching a silicon oxide film under conditions that argon has a flow rate ranging from 50 sccm to 2000 sccm, C_4F_8 has a flow rate ranging from 0.5 sccm to 50 sccm, and the mixture has a pressure ranging from 0.01 Pa to 3 Pa.

38. (twice amended) A plasma etching method in accordance with ~~Claim~~claim 37, further including the step of

adding CO gas the mixture to etch a silicon oxide film, the CO gas having a flow rate ranging 50 sccm to 300 sccm.

39. (twice amended) A plasma etching method in accordance with ~~Claim-claim~~ 37, further including the step of adding oxygen gas to the mixture to etch a silicon oxide film, the oxygen gas having a flow rate ranging 0.5 sccm to 50 sccm.

40. (twice amended) A plasma etching method in accordance with ~~Claim-claim~~ 37, further including the step of adding CHF₃, CH₂F₂, CH₄, CH₃F hydrogen gas, or a mixture thereof is added to the mixture to etch a silicon oxide film, the gas added having a flow rate ranging 0.5 sccm to 50 sccm.

41. (twice amended) A plasma etching method for use with a plasma etching system in accordance with ~~Claim-claim~~ 1, further including the step of using C₂F₆, CHF₃, C₃F₆O₅, C₃F₈, or C₅H₈, C₂F₄, CF₃I, C₂F₅I, C₃F₆ gas to etch a silicon oxide film.

42. (twice amended) A plasma etching system, wherein CO gas is added to the gas of ~~Claim-claim~~ 41 to etch a silicon oxide film.

43. (twice amended) A plasma etching system, wherein oxygen gas is added to the gas of ~~Claim-claim~~ 41 to etch a silicon oxide film.

44. (twice amended) A plasma etching method for use in the plasma etching system in accordance with ~~Claim~~claim 1, comprising the step of:

using as the source material gas a mixture of argon and C_5F_8 ; and

etching a silicon oxide film under conditions that argon has a flow rate ranging from 50 sccm to 2000 Sccm, C_5F_8 has a flow rate ranging from 0.5 sccm to 50 sccm, and the mixture has a pressure ranging from 0.01 Pa to 3 Pa.

45. (twice amended) A plasma etching method for use in the plasma etching system in accordance with ~~Claim~~claim 1, comprising the step of:

using chlorine as the source material gas; and

etching a material of silicon, aluminum, wolfram, or a material primarily including silicon, aluminum, or wolfram under a condition that the gas has a pressure ranging from 0.1 Pa to 4 Pa.

46. (twice amended) A plasma etching method for use in the plasma etching system in accordance with ~~Claim~~claim 1, comprising the step of:

using HBr as the source material gas; and

etching a material of silicon, aluminum, wolfram, or a material primarily including silicon, aluminum, or wolfram under a condition that the gas has a pressure ranging from 0.1 Pa to 4 Pa.

47. (twice amended) A plasma etching method for use in the plasma etching system in accordance with ~~Claim~~claim 1, comprising the step of:

using a mixture of chlorine and HBr as the source material gas; and

etching a material of silicon, aluminum, wolfram, or a material primarily including silicon, aluminum, or wolfram under a condition that the mixture has a pressure ranging from 0.1 Pa to 4 Pa.

48. (twice amended) A plasma etching method in accordance with ~~Claim~~claim 45, further including the step of:

adding oxygen gas to the source material gas to etch a material of silicon, aluminum, wolfram, or a material primarily including silicon, aluminum, or wolfram.

49. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 1, wherein methane gas, chlorine gas, nitrogen gas, hydrogen, CF_4 , C_2F_6 , CH_2F_2 , C_4F_8 , NH_3 , NF_3 , CH_3OH , $\text{C}_2\text{H}_5\text{OH}$ or SF_6 is used as the source material gas to etch a material primarily including an organic substance.

50. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 1, wherein the magnetic field generated by the magnetic field generating means is intensity of 100 gauss or less between the planar plate and the sample.

51. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 1, wherein the plasma is generated without using the magnetic field generating means.

52. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 5, wherein the second electromagnetic wave ~~superpose~~superposed to the planar plate ~~in accordance with Claim 5~~ is divided to obtain part thereof to supply the part to the sample.

53. (twice amended) A plasma etching system in accordance with ~~Claim~~claim 1, wherein the electromagnetic wave to generate the plasma has a frequency ranging from 200 MHz to 950 MHz.

54. (twice amended) A plasma etching method for use in the plasma etching system in accordance with ~~Claim~~claim 1, comprising the steps of:

using a mixture of $\text{Cl}_2 + \text{BCl}_3$, $\text{Cl}_2 + \text{BCl}_3 + \text{CH}_4$, $\text{Cl}_2 + \text{BCl}_3 + \text{CH}_4 + \text{Ar}$, $\text{Cl}_2 + \text{BCl}_3 + \text{CHF}_3$, $\text{Cl}_2 + \text{BCl}_3 + \text{CH}_2\text{F}_2$, $\text{Cl}_2 + \text{BCl}_3 + \text{HCl}$, $\text{Cl}_2 + \text{BCl}_3 + \text{HCl} + \text{CH}_4 + \text{Ar}$, $\text{Cl}_2 + \text{BCl}_3 + \text{N}_2$, $\text{Cl}_2 + \text{BCl}_3 + \text{N}_2 + \text{HCl}$, $\text{Cl}_2 + \text{BCl}_3 + \text{CHCl}_3$; and

etching material of silica, aluminum, wolfram, or a material primarily including silicon, aluminum, or wolfram under a condition that the mixture has a pressure ranging from 0.1 Pa to 4 Pa.

Please add the following new claims:

--56. A plasma etching system in accordance with claim 1, wherein the ring-shaped member has electrical power supplied thereto without supplying gas therethrough.

57. A plasma etching system in accordance with claim 34, wherein the ring-shaped member has electrical power supplied thereto without supplying gas therethrough.

58. A plasma etching system for use with a surface etching apparatus in which in a vacuum chamber including vacuum generating means, source material gas supply means, sample setting means, and high-frequency power applying means, the source material gas is transformed into plasma to achieve surface etching of the sample, means for generating the plasma including electromagnetic wave supply means and magnetic field generating means, comprising:

a controller for introducing the electromagnetic field from a planar plate disposed in parallel with the sample into the vacuum chamber, for setting a distance between the plate and the sample to a value in a range from 30 mm to one half of a smaller one of respective diameters of the sample and the plate, and for controlling a quantity of reaction between a surface of the planar plate and radicals in the plasma;

wherein the distance between the sample and the plate is maintained during plasma etching.

59. A plasma etching system in accordance with claim 58, wherein the planar plate has a diameter ranging from 0.7 times that of the sample to 1.2 times that of the sample.

60. A plasma etching system in accordance claim 58, wherein the electromagnetic wave to generate plasma has a frequency ranging from 300 MHz to 500 MHz.

61. A plasma etching system in accordance with claim 58, wherein the electromagnetic field generated by the electromagnetic field generating means to generate plasma has an intensity satisfying a condition for electron cyclotron resonance between the planar plate and the sample.

62. A plasma etching system in accordance with claim 60, wherein the controller for controlling the quantity of reaction between the surface of the planar plate and the plasma is means for superposing an electromagnetic wave of a another frequency onto the planar plate, the electromagnetic wave being different from the electromagnetic wave of the frequency ranging from 300 MHz - 500 MHz.

63. A plasma etching system in accordance with claim 62, wherein the another frequency of the electromagnetic wave superposed to the planar plate ranges from 50 kHz to 30 MHz, and the frequency applied to the planar plate has a power of 0.05 W/cm^2 to 5 W/cm^2 .

64. A plasma etching system in accordance with claim 58, wherein the means for making radicals incident to a surface of the sample uniform in quantity and type thereof is a ring-shaped member disposed in a periphery of the sample.

65. A plasma etching system in accordance with claim 64, wherein the ring-shaped member includes a surface to be brought into the plasma, the surface being made of silicon, carbon silicon carbide, quartz, aluminum oxide or aluminum.

66. A plasma etching system in accordance with claim 66, wherein the ring-shaped member is applied with high-frequency power.--